Agricultural Research Service

Information Technology Capital Investment Plan

Strategic Narrative, Portfolio Overview, and Exhibits
Budget Year 2002

ARS Information Technology Investment Plan
Strategic Narrative, Portfolio Overview, and Exhibits for FY 2002

The ARS Information Technology Capital Investment Portfolio

The Agricultural Research Service (ARS) Information Technology (IT) capital investment plan sets forth a strategy for how the Agency will invest capital and staff resources in technologies to advance and support organizational goals and objectives. The capital investment plan consists of four main components:

- a narrative description of the Agency IT environment;
- a portfolio of IT initiatives (under separate cover);
- portfolio exhibits required for external reporting; and,
- a narrative technical profile describing future direction.

The portfolio of IT initiatives provides an accounting of all IT projects and activities in the Agency, and identifies current and projected costs for IT staffing (salaries and benefits), equipment, software and supplies, support contracts and services, and intra-governmental payments and collections.

This IT capital investment portfolio was prepared as directed by the Office of the Chief Information Officer (OCIO) of the United States Department of Agriculture (USDA) for inclusion in departmental budget submissions to the Office of Management and Budget (OMB). All USDA agencies are required to develop IT capital investment portfolios on an annual basis in conjunction with a capital planning and investment analysis process for selecting, evaluating and controlling IT investment initiatives.

Contents

This document contains the narrative portions of the IT capital investment plan, an overview of the investment portfolio, IT initiative highlights, and portfolio exhibits required by USDA. Please refer to the investment portfolio document for detailed information on initiatives and costs, entitled Agricultural Research Service Information Technology Capital Investment Portfolio, Initiatives and Projected Costs for Budget Year 2002.

The Agricultural Research Service

The Agricultural Research Service (ARS), one of the Research, Education, and Economics (REE) agencies, is the principal in-house physical and biological science research agency in the United States Department of Agriculture (USDA). ARS is charged with extending the nation's scientific knowledge across a broad range of program areas that affect the American people on a daily basis.

ARS conducts research to develop and transfer solutions to agricultural problems of high national priority and provides information access and dissemination to

- ensure high-quality, safe food and other agricultural products,
- assess the nutritional needs of Americans,
- sustain a competitive agricultural economy,
- enhance the natural resource base and the environment, and
- provide economic opportunities for rural citizens, communities, and society as a whole.

ARS has eight regional Area Offices throughout the United States with 105 locations and laboratories which conduct research in animal and crop production, product value and safety, natural resources and sustainable agricultural systems, and human nutrition. The National Program Staff (NPS) at Agency headquarters in Beltsville, Maryland, plans and directs the National Research Programs of the Agency, coordinating the work of approximately 2000 PhD scientists in over 1200 research projects. ARS also includes the National Agricultural Library (NAL), one of the four National libraries in the U.S. and a major international source for agricultural and related information.

The Administrative and Financial Management (AFM) unit of ARS provides consolidated human resources, procurement, property, facilities, and financial management services to the REE agencies. AFM also provides telecommunications and central services support (such as records and mail management) to ARS and the REE agencies. In total, ARS employs about 6,000 personnel in scientific, support, and administrative positions.

ARS Organization
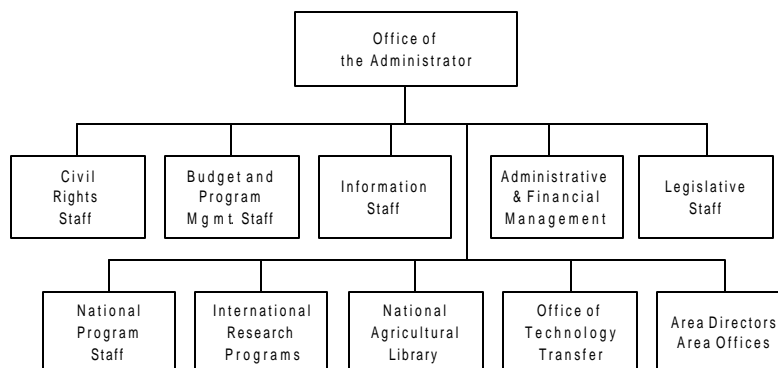
For more information about ARS, its programs and offices, visit the ARS Web page at http://www.ars.usda.gov.

ARS and Information Technology

Information Technology in Program Delivery

Virtually every ARS research project applies information technology. Many researchers use specialized state-of-the-art computer capabilities such as data acquisition devices, statistical computing, scientific graphics, decision support systems with embedded expert systems, and simulation modeling programs. Capturing and reporting research data and results is information intensive, often requiring the use of database technology to manage large amounts of research information. The nature of the research being performed will determine the type of computing resources needed at each location and for each research project.

Information technology also plays an important role in research program management and in communicating program results to customers and stakeholders. ARS operates several program management and administrative systems to support research project management, budget allocation and tracking, resource planning, and reporting program results. The administrative and general support functions of AFM utilize information technology to deliver network and communications systems and administrative information systems. Internet and Web technology are increasingly used to facilitate information sharing and communications among research units, Area Offices, and Headquarters staff, as well as to provide information to ARS customers, stakeholders, and partners.

IT Strategies and Goals

In September of 1998, ARS developed a strategic framework for IT, including overall goals and objectives for strengthening the Agency's IT program and use of IT in program delivery and administration. The goals identified in the strategic plan continue to guide the ARS IT program, and will be updated within the 2001 fiscal year to reflect the progress made in 1999 and 2000 and to identify new thrusts for the upcoming years. The ARS capital IT investment plan and portfolio of initiatives are consistent with the 1998 strategic IT plan, and serve to further the goals and objectives contained therein.

ARS 1998 Strategic Information Technology Plan Goals

1. The ARS mission drives its information systems and the deployment of information technology.

2. ARS information systems are reliable, secure, relevant, innovative, well-planned, and effectively managed.

3. ARS staff possess the skills necessary to meet the challenges of effectively delivering programs and services with information technology.

4. ARS information systems enable development of advanced knowledge-base systems and decision tools to bring the best science, data, and knowledge to bear in solving contemporary agricultural problems.

5. Continually improve information systems that facilitate awareness, access, transfer, preservation, and use of research accomplishments and agriculturally-related information by researchers,

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IT Organization, Functions and Customers

ARS has traditionally operated in a decentralized IT environment, with each major unit of the Agency procuring, developing, and operating IT systems and capital assets according to their own needs and architecture. The majority of IT staff in ARS are located in field offices providing direct support to research units, not housed within an IT organizational structure. At present, several operational IT organizational structures exist within ARS, including the Information Technology Division (ITD) within AFM, the Computer Staff of NPS, the Information Systems Division (ISD) of NAL, and eight small computer staffs within each of the Area Offices. These units perform a variety of IT functions for ARS program and administrative staff, including local and wide-area networking, information systems development and operation, technology assessment and integration, Web development, voice and data telecommunications, and technical assistance to computer users. ARS employs a total of 246 staff in computer specialist and related occupational series, 141 of which are distributed among research units.

Effective July 2000, ARS has created a Chief Information Officer position and staff to plan and coordinate Agency IT programs and activities, establish Agency IT policies and standards, and implement an Agency IT architecture. The Chief Information Officer position is a Senior Executive Position reporting to the Administrator, with eleven staff members from existing IT organizations in ARS. The ARS CIO organization will work closely with senior program managers and staff in developing IT strategies to enhance mission performance, communications, and information management. In addition, the CIO organization will work to make the most effective use of IT resources, establish meaningful performance measures for IT, and ensure compliance with Departmental and governmental IT policies and regulations.

ARS IT Organization
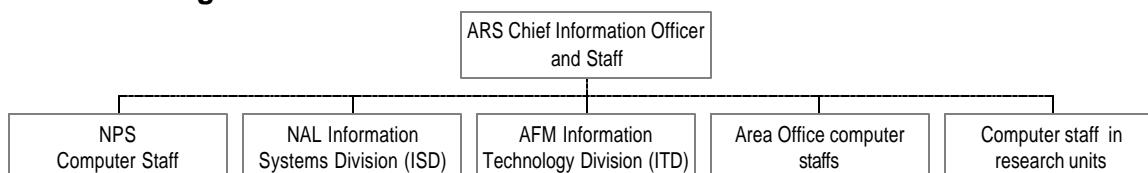
IT activities and support for individual research programs continues to be decentralized, as computing and technology requirements for laboratory and other research is highly specific and not part of an overall technology architecture.

The ARS IT Capital Planning Process

The Information Technology Management Reform Act of 1996 requires federal agencies to establish a capital planning and investment analysis process for evaluating investments in information technology. In 1998, ARS commissioned a team of program managers to develop a charter for an Agency Information Technology Investment Review Board (ITIRB). With the establishment of the ARS CIO organization this year, ARS will now move forward in formalizing a capital planning and investment analysis process to evaluate, select, and monitor significant investments in technology in conjunction with an ITIRB.
The capital planning process will focus on investments or projects involving management processes and systems, centralized or administrative systems, and corporate technical infrastructure or capability rather than investments in technologies to support specific research

projects or experiments. In support of the capital planning process, the CIO organization will also establish standards for IT project planning, reporting and performance measurement.

The Agency's objective for IT capital planning is to identify and support investments which will:

- Support priority mission functions;
- Reduce cost, improve effectiveness, make maximum use of commercial technology;
- Demonstrate a return on investment;
- Blend or link with the Department's IT architecture;
- Avoid custom-designed components, use pilots, report accountability, and have leader support;
- Have a breakdown of working/beneficial phases; and
- Distribute risks between Agency and contractor, support competition, tie contract payment to accomplishment, or take maximum advantage of commercial technology.

Portfolio Overview

Initiatives and Total Projected Costs

The ARS portfolio includes seventeen IT initiatives in three general categories:

- Program Information Systems and IT Support
- Headquarters and Administrative Systems and IT Support
- Infrastructure and Office Automation

The seventeen initiatives are identified and described in the section that follows, IT Initiative Highlights. For detailed information on each initiative, including costs, please refer to the companion document, the ARS IT Capital Investment Portfolio.

Two of the seventeen ARS IT initiatives hold special designations according to USDA and OMB criteria. The Integrated Program Management System is considered a *significant/non-major* investment, as it involves a significant investment to re-engineer key Agency program management and administration legacy systems, and plays a central role in the ARS systems, information, and communications architecture. The Radio Program, a Departmentally mandated activity to migrate radio systems to narrow band frequencies, is the only initiative requiring special reporting to OMB later in the fiscal year in the form of a 300B Exhibit.

Projected costs for ARS IT initiatives and general support activities include all costs associated with the initiatives, including staffing costs (salaries and benefits), equipment and supplies costs, commercial and other contract services, and intergovernmental payments and collections. Costs associated with development, modernization and/or enhancement of information systems or technology are distinguished from routine costs for support activities and maintenance of operational systems.

Total projected costs for all ARS IT initiatives for the previous, current, and budget years are as follows:

Fiscal Year	Development/ Modernization/ Enhancement	Steady State	Total Investment Cost
2000	5062859	25431212	$ 30,494,071
2001	6619980	26729924	$ 33,349,904
2002	8256005	27410676	$ 35,666,681

Increases in costs from FY 2000 to FY 2002 reflect a cost of living adjustment of 3.7% per year, an inflationary rate of 2.6% per year, and increases and decreases in activity levels among existing and new initiatives.

Previous projections for FY 2000 and 2001 were higher, approximately $37.85 million and $40.40 million respectively. These projections were updated based on actual IT expenditure data from

FY 1999, updated activity and cost estimates for each initiative from project directors, and a recalculation of FTE costs based on actual positions. In many cases, cost distributions among developmental costs and steady state costs were adjusted. In addition, funding received by AFM for support services to the Cooperative State Research Education and Extension Service (CSREES), the National Agricultural Statistics Services (NASS), and the Economic Research Service (ERS) are now included as an intergovernmental collection for ARS (approx. $467,000 in FY2002).

Investments by Major Object Class

(Dollars amounts displayed in Dollars)

Major Object Class	FY 2000	FY 2001	FY 2002
1. EQUIPMENT	$ 2,191,648	$ 2,930,784	$ 4,121,302
2. SOFTWARE	1,108,422	1,532,538	1,401,397
3. SERVICES	2,204,835	2,191,724	2,328,357
4. SUPPORT SERVICES	5,515,320	5,472,086	5,550,508
5. SUPPLIES	1,112,334	1,156,658	1,192,697
6. PERSONNEL (compensation/benefits)	15,598,916	17,061,612	17,674,324
7. OTHER	0	0	0
8. INTRA-GOVERNMENTAL PAYMENTS	3,197,131	3,455,115	3,865,381
9. INTRA-GOVERNMENTAL COLLECTIONS	(434,535)	(450,613)	(467,285)
Total	$ 30,494,071	$ 33,349,904	$ 35,666,681

Projected Costs by Initiative

(Dollar amounts displayed in Dollars)

Initiative	FY 2000	FY 2001	FY 2002
Germplasm Resource Information Network (GRIN)	$ 650,593	$ 892,791	$ 757,650
National Nutrient Databank	$ 627,989	$ 480,921	$ 518,902
AGROS	$ 89,700	$ 89,700	$ 89,700
Preserving USDA Digital Publications	$ 0	$ 0	$ 200,000
Integrated System for Information Services (ISIS)	$ 610,000	$ 1,445,000	$ 620,000
Replace Obsolete Library Management System	$ 0	$ 0	$ 450,000
NAL IT Services, Operations, and Maintenance	$ 2,596,000	$ 2,792,000	$ 2,800,000
Other- Research/Mission IT and Support	$ 12,746,009	$ 13,168,973	$ 13,606,324
Integrated Program Management System (RMIS Redesign)	$ 988,520	$ 1,027,107	$ 926,140
Headquarters IT Systems and Services (AFM/NPS)	$ 4,109,024	$ 4,362,820	$ 4,931,547
Location Obligation Tracking System (LOTS)	$ 24,000	$ 14,590	$ 15,111
Budget Allocation System (BAS)	$ 39,939	$ 41,416	$ 42,949
Annual Resource Management Planning System (ARMPS)	$ 17,000	$ 19,454	$ 20,148
NAL Information and Communications Technology Infrastructure	$ 0	$ 0	$ 200,000
ARS Telecommunications	$ 7,503,980	$ 7,881,346	$ 8,414,650
Information Technology Security	$ 378,000	$ 1,015,810	$ 1,008,258
Mandated Radio Equipment Replacement	$ 113,317	$ 117,976	$ 1,065,302
Total Projected IT Investment	$ 30,494,071	$ 33,349,904	$ 35,666,681

Initiatives Requiring Additional Funding

Projected costs for most initiatives reflect existing funding for staffing and operations. The following initiatives will require additional funding for projected activities and costs:

- NAL Digital Publications
- NAL Library Management System
- NAL Improve Communications Security
- *Integrated Program Management System (IPMS)
- HQ IT Services
- *IT Security
- Radio Program

Funded from the newly established ARS CIO Office

IT Staffing Resources by Initiative

ARS has a total of 246 FTE positions in computer specialist and related occupational series. Distribution of IT Staff among portfolio initiatives is as follows:

Initiative	FTE
GRIN	7
Nutrient Databank System	2
AGROS	1
Digital Publications	1
ISIS	4
Library Management System	0
NAL IT Services	17
Other- Research/Mission Support	141
Integrated Program Management System	8
HQ IT Services (AFM & NPS)	44
Financial Systems: LOTS, BAS, and ARMPS (total)	.85
NAL Improve Communications Security	0
Telecommunications	8.5
IT Security	10.75
Radio Program	.50
Total	245.6

IT Initiative Highlights

Program Information Systems and IT Support

Germplasm Resource Information Network

The Germplasm Resources Information Network (GRIN) provides support to the national research programs whose missions are to acquire, maintain, evaluate, use, and make available to scientists a wide range of economically important plant, animal, microbial, and insect germplasm. This germplasm provides the genetic diversity necessary to improve agricultural productivity to reduce genetic vulnerability in future food and agriculture development. The germplasm is maintained by networks of cooperating institutions, agencies, and research units in the federal, state, and private sectors with ARS providing the national leadership.

The GRIN project develops and maintains an extensive national, integrated, computer-based information system designed specifically for managing genetic resources as part of the National Genetic Resources Program. The system is in the form of a network, centered at Beltsville in a series of computer servers, with nodes at genebanks at more than 20 sites throughout the country. GRIN manages germplasm inventory information (amounts of seeds or propagules available, viability, vigor, to whom the sample was distributed, etc.), descriptive data associated with each germplasm accession (sample)--such as when, where, and how the sample was acquired, by whom, and scientific name for the species represented. Also, the descriptive data may include information about the germplasm's agriculturally-important traits, e.g., disease/pest/climatic resistance, high yield, high quality product, etc. This network supports the entire U. S. genetic resource management system, and has also been adopted by other nations such as Canada and India. Users access it through the World Wide Web (WWW), or via a CD-ROM, PC version.

National Nutrient Database

The NDBS is an authoritative food composition database. It is supported by state-of-the-art methods to acquire, evaluate, compile, and disseminate composition data on foods available in the U.S. It serves the needs of the public to address food and health concerns.

AGROS - NAL

AGROS is a USDA data and information management system designed to meet the need for accurate and timely agro-ecosystem and earth science data in a manner that is easily accessible to end users. It will provide an integrated decision tool for researchers and field agricultural production systems. It is also intended to become the value-added agro-ecosystem image intensive earth science system information service provider of choice to identified market segments. It was created as a collaboration of USDA with NASA and the US Global Change Research Program and Phase I of a 3-Phase development plan was funded by the GSA IT Innovation Fund.

The objectives of AGROS are to:

- Provide an integrated decision support tool for field level agricultural production systems and a powerful investigative tool to agricultural scientists.
- Expand the functionality of off-the-shelf technologies to increasing types of customers across increasing datasets and data types.

- Provide scientists and farmers with a common and interactive knowledge dataset to solve real-time agricultural production problems.
- Become the value-added agro-ecosystem image-intensive earth system science information service provider of choice to identified market systems.
- To achieve self-sustainability and growth by adequately meeting current customer needs and developing functionality and content to an increasing number of market clusters.

Preserving Digital Publications - NAL
The Digital Publications initiative is a collaborative program involving NAL, representatives of USDA OCIO, key representatives of USDA mission areas, and other stakeholders to preserve selected USDA digital publications to implement a long-term strategy to ensure that the growing body of USDA digital publications is systematically achieved. Funding at the requested level is necessary to address this issue immediately and thereby avoid the irrevocable loss of the Department's electronic publications.

Information System for Information Services (ISIS)- NAL
ISIS is an integrated library system that automates management of virtually all library operations within the National Agricultural Library. The system has component modules that facilitate resource selection, acquisition, indexing, cataloging, circulation, and document delivery. ISIS provides access to the NAL Online Public Access Catalog (OPAC) where users can identify resources available from NAL holdings. ISIS is also used to produce, maintain, and enhance the NAL's AGRICOLA (Agriculture Online Access) bibliographic database of more than three million citations to the scientific literature of agriculture. ISIS began its current system life-cycle in 1992 and will be reevaluated in 2001 to determine what future directions are required to capitalize on technology advances and meet the needs of NAL's customers.

Replace Obsolete Library Management System- NAL
The purpose of this initiative is to replace NAL's obsolete library automated management system which is now more than 12 years old. NAL's obsolete system is inadequate to manage the vast amount of vital agricultural information converted from print or currently produced in digital form, such as USDA and other US government publications that exist only as digital publications; GIS and statistical data; and so on. The current system cannot keep pace with the requirements and computer capabilities of the typical USDA bench scientist or administrator or provide data and information in ways that save time for such important NAL clients. It is critical that the NAL management system profit from telecommunications and the dominance of the World Wide Web to achieve internal efficiencies and simplify and multiply worldwide access to NAL treasures and services. NAL has performed intensive reviews of user and technical requirements for software and equipment required to manage and disseminate its information electronically.

NAL Information Technology Services, Operations, and Maintenance
This initiative includes IT investments for information services provided by the NAL Information Systems Division (ISD), such as the current awareness literature search and retrieval services performed by NAL for USDA scientists; information dissemination; commercial database services; web site development and web site management; database development; PC/peripheral equipment acquisition; and end-user support to the NAL staff for operation and maintenance of computers and servers for NAL information systems.

<u>Other- Research/Mission IT and Support</u>
This initiative includes the IT resources and staffing provided in direct support of ARS research projects. The costs for direct research/mission IT support are estimated based on projected staffing costs and overall IT expenditures in previous years. No systematic method of tracking actual expenditures on this type of IT activity have been implemented to date.

While most laboratories and CRIS projects utilize information technology in some manner, the nature and extent of the technology employed ranges based upon the research being performed. The following research projects provide several examples of how information technology is used to support program objectives:

Develop information systems for marker assisted selection
Develops information systems to support a genomics program, including continual development of a relational database that accommodates new types of genomic information, and maintains, integrates, and distributes data within and between laboratories and species; distributes genetic linkage maps and associated information via Web sites; and develops automated processes to compare, analyze, and interpret large volumes of genomic information from different databases and species.

Risk modeling to improve the microbiological safety of poultry products
Develop predictive models for growth of Salmonella spp on raw and cooked chicken. Develop simulation models for assessing the risk and severity of human pathogenic bacterial infections from icken. Predictive models were incorporated into the ARS, Poultry Food Assess Risk Model (Poultry FARM) which is available to producers, processors, regulatory agencies, scientists, and the public.

Research and development for plant genome informatics
This project, centered at Ithaca, NY, develops, maintains, and delivers genome databases for rice (RiceDB), the potato/tomato family (SolGenes), and together with the ARS project at Albany, CA GrainGenes for small grains. It also serves as the central delivery point under the name of "Demeter's Genomes," for the other ARS-supported crop genome databases. These databases provide the genetics/genomics research community with information regarding genetic and physical maps, genes, gene products, clones, DNA sequences (often from ESTs–expressed sequence tags–parts of expressed genes) and key agricultural traits (e.g., quality properties, resistance to biotic and abiotic stresses). Users access the databases via the WWW. The databases are continually updated with new information and literature references, and new links are established with other external genome and biological databases, including the GRIN database. These databases are critical tools for small grains, rice, and potato/tomato genetic/genomic research worldwide. Also, in collaboration with Cornell University's Theory Center (which houses supercomputers), this project will develop advanced bioinformatic tools for automating various database maintenance and development tasks, and for facilitating rapid analysis of the voluminous nucleotide and amino acid sequence data generated by high-throughput genomic analyses.

Maize Genome Database: MaizeDB
This project, centered in Columbia, MO, develops, maintains, and delivers a maize (corn) genome database (MaizeDB) that provides the genetics/genomics research community with information regarding maize genetic and physical maps, genes, gene products, clones, DNA sequences (often from ESTs–expressed sequence tags–parts of expressed genes) and key maize traits. Users access MaizeDB via the WWW. The database is continually updated with new information, and new links are established with other external genome and biological databases, including the GRIN database. MaizeDB is a critical tool for maize genetic/genomic research worldwide.

Development and resources for genetic improvement of small grains and sugarcane
This project, centered in Albany, CA and Ithaca, NY, develops, maintains, and delivers a small grains (wheat, barley, oats) genome database (GrainGenes) that provides the genetics/genomics research community with information regarding small grains (especially wheat and barley) genetic and physical maps, genes, gene products, clones, DNA sequences (often from ESTs–expressed sequence tags–parts of expressed genes) and key cereal traits (e.g., flour properties, resistance to biotic and abiotic stresses).   Users access GrainGenes via the WWW. The database is continually updated with new information and literature references, and new links are established with other external genome and biological databases, including the GRIN database. GrainGenes is a critical tool for wheat and barley genetic/genomic research worldwide.

Improving genetic prediction of economic merit of dairy cattle
Maintains national database for genetic research on milk yield, composition, and fitness traits. Delivers genetic information instantaneously with an extensive Web site directly to the dairy producers (2000 USDA Hammer Award).

Dynamic simulation model for evaluation of strategic beef cattle management decisions
Developed computer software to provide decision support for beef production managers with user-friendly graphical interfaces. Software has been evaluated by beef producers, improvements made according to recommendations, and made publically available to cattle producers on a CD.

Biologically based management systems for cereal aphids
A decision-support system was developed for integrated pest management of greenbugs in winter wheat in the Southern Plains region. The software involves interfacing computer simulation models of greenbug population growth, weather, and wheat growth with an expert system. The decision support system will aid farmers in making optimal greenbug pest management decisions. The system is being tested by wheat growers, county agents, and crop consultants, and their recommendations will be used to improve it. The system will be distributed to users via CD and the internet.

Systematics of mites, scales, aphids, thrips, termites and whiteflies of agricultural importance
A computerized synthesis of information on the scale insects of the world was developed and made accessible via the World Wide Web. This online resource supports queries by scientific name, common name, host plant, and geography and provides information and literature citations concerning taxonomy, biology, economic importance, and control.

Communications and insect and mite taxonomic services
Developed a client/server relational database used for tracking and reporting Systematic Entomology Laboratory (SEL) identifications of insects and mites. In conjunction with development of the database, methods for electronic exchange of data with the APHIS/PPQ PIN database were developed. The identifications reported include those of URGENT submittals from APHIS ports of entry where shipments are held pending the identification from SEL. The submittal information is copied to the SEL system from the APHIS PIN system and the specimens arrive by Federal Express. Some submittals are also made as digital images which are sent via email. Electronic reports of URGENT and other identifications for APHIS are copied to the APHIS network at 10 to 15 minute intervals throughout the day.

Development and maintenance of a genome database for soybeans and other legumes
This project, centered at Ames, IA, develops, maintains, and delivers a soybean genome database (SoyBase) that provides the genetics/genomics research community with information regarding soybean genetic and physical maps, genes, gene products, clones, DNA sequences (often from ESTs–expressed sequence tags–parts of expressed genes) and key soybean traits (e.g., oil and protein properties, resistance to biotic and abiotic stresses).   Users access SoyBase via the WWW. The database is continually updated with new information and literature references, and new links are established with other external genome and biological databases, including the GRIN database. SoyBase is a critical tool for soybean genetic/genomic research worldwide.

Headquarters and Administrative Systems and IT Support

Integrated Program Management System

The Integrated Program Management System (IPMS) is a multi-year project to re-engineer key agency legacy databases into an Agency-wide integrated information management system. The IPMS system is the key program information system in ARS, containing management information on Agency program activities and resources. IPMS contains qualitative and quantitative data on ARS National Programs and Current Research Information System (CRIS) projects, including goals and objectives, research problem areas, staff and funding resource allocations, and project activities and accomplishments. CRIS projects are classified according to numerous subjects such as type of research, commodity, field of science, and funding sources. The database also contains information on program activities and products related to CRIS projects, such as manuscript publications, agreements, patents, licenses, peer reviews, and foreign travel engagements.

The primary legacy system being replaced by IPMS is the Research Management Information System (RMIS), a Wang/Pace client/server system implemented in 1984. The last major technological migration took place in 1988. The RMIS system requires client software on each of the approximately 1100 users' personal computers. This is difficult and costly to maintain. The database hardware and software are old and no longer supported. The data in the RMIS system is valuable to a diverse population within ARS, but difficult for the casual user to retrieve, manipulate, and re-use. Although contingency plans are in place for disaster recovery, the old system must be replaced and be integrated with other systems with similar data, operate within a modern technical architecture, and provide support for new business requirements.

To achieve modernization, ARS is implementing a phased approach to re-engineer the legacy systems into the IPMS. In phase I, the RMIS system Wang/Pace platform, database and user interface will be migrated to an Oracle/Sun Solaris platform with user access through a web-enabled interface. In phase II, an integrated database structure will be implemented to incorporate other dated databases, new functionality will be added based on updated business requirements, and enhanced user tools will be provided to do "what-if" and "slice and dice" analysis. Phase II will be implemented on a module-by-module approach. The entire re-engineering effort is scheduled to be completed by Fiscal Year 2003.

Headquarters IT Systems/Services

The ARS Information Technology Division (ITD) within Administrative and Financial Management (AFM) provides direct computing, network, information systems, Internet/web pages, and telecommunications support to the functional business units of AFM. ITD also provides support for administrative business systems, telecommunications and for mail, records, and copiers to ARS as a whole and the other three agencies of the Research, Education, and Economics mission area (NASS, ERS, CSREES). ARS receives financial reimbursement from the REE agencies for the IT services they receive.

The NPS computer staff provides direct technology support to NPS, including operations and maintenance of the RMIS System and associated applications and NPS web page, network, and desktop PC support. The NPS computer staff provide technical support for all users of RMIS on an as-needed basis, including Area and field offices in ARS. Costs associated with RMIS

operations and maintenance are included in this initiative.

ARS staff supporting the LOTS and ARMPS financial systems, telecommunications, and radio program initiatives are housed within ITD. The FTE and other costs associated with these activities are not included in this initiative.

Financial Systems
Three systems in the ARS portfolio are identified as financial systems, the Location Obligation Tracking System (LOTS), the Budget Allocation System (BAS), and the Annual Resource Management Planning System (ARMPS). These systems provide automated support for resource planning, allocation tracking, and project-level expenditure tracking. None of these systems are considered official accounting systems, but rather provide management information to ARS staff for day-to-day operations and activities. All three of these systems are several years old, and slated for replacement within the next two to three years. The principal resource planning tool, ARMPS, is scheduled to begin conversion from a PC-based system to an Oracle DBMS on October 1, 2000.

ARS uses the National Finance Center's (NFC) databases as its official database except where unique internal requirements dictate otherwise. The Financial Management Division (FMD) of AFM is working to establish the system inter-connectivity required to provide consolidated administrative support services, with emphasis on national systems to support program goals and objectives. Information technology will be critical to ensure that our users have efficient access to financial databases, that required processing cycles are effectively run, and that standard and ad hoc reports can be produced to our satisfaction.

The Foundation Financial Information System (FFIS) Initiative
The USDA Office of the Chief Financial Officer and the FFIS Project Office have informed the REE Mission Area that the four REE Agencies (ARS, ERS, NASS, and CSREES) will implement FFIS on October 1, 2001 (FY 2002). The REE Agencies have begun working with the FFIS Project Office in the preliminary planning stages for the configuration/conversion process on October 1, 2000. In the meantime, no other major financial system initiatives are planned in REE. Existing REE funds control systems are in maintenance mode and no major modifications are planned.

Infrastructure and Office Automation

NAL- Improve Information Systems Communications Security
The purpose of this initiative is to acquire hardware and software solutions that improve the security of IT systems while enhancing communications capabilities. NAL will acquire and implement new technological solutions for Web access; networking; firewall, intrusion detection and other information security measures that will protect NAL capabilities to enhance services. NAL staff will be better equipped to meet the information resource needs of agricultural researchers, other scientists, agricultural consultants, local producers and farmers, educators, librarians and the general public.

ARS Telecommunications

ARS recognizes the benefits of effective communications facilities, and employs telecommunications technologies to facilitate employee and customer communications and access to program information and data. For capital planning purposes, telecommunications includes local and wide area networks, telephone equipment and services, teleconferencing and two-way video, Internet communications facilities, and satellite communications services.

The Agency is modernizing its telecommunications systems to support increasing voice, data, and image traffic requirements, and to offer enhanced capabilities in the most cost-effective manner possible. The dispersed field structure and communication requirements for information exchange require the allocation of significant resources to sustain the needed levels of activity and the capacity for high volumes of traffic. ARS voice and data communications networks are designed according to location requirements and architectural standards.

ARS continues to increase information sharing capabilities through local and wide area networks, expand high speed access to databases in support of researchers and other specialists, and increase satellite downlink, teleconferencing and two-way video capabilities to facilitate communications and reduce travel requirements and costs. During calendar year 2000, the Agency will be completing its transition from FTS2000 to FTS2001, including voice service, E-Mail, and data transmission through packets, frame relay, DTS circuits, and switched data video connections. The telecommunications staff at headquarters work with Area Computer Specialists to develop, coordinate, implement, and evaluate telecommunication products and services available from commercial or contract sources.

Information Technology Security

Over the last few years, agency use of Local and Wide Area Networks (LAN/WAN) and the Internet has increased significantly.   Virtually all scientific and administrative staff regularly use agency networks and the Internet to gather, exchange, share, and maintain important research and administrative information. As access to critical agency systems and data has increased throughout the agency, the agricultural and research community, and the general public; the vulnerability of those systems and data to security threats has also greatly increased. Threats such as Distributed Denial of Service attacks, defacing WEB sites, computer viruses, and other attacks have become increasingly commonplace throughout industry and the government. As a result of these growing risks, ARS has restructured and increased its emphasis on its information systems security program to better protect the integrity and availability of critical agency systems and data. The goal of the program is to develop and implement cost effective solutions to emerging security threats, problems, and issues. Emphasis will be placed on security awareness and training, risk assessment, risk mitigation strategies, contingency planning, and network security.

The ARS Security Program has been reorganized. The agency Security Officer was formerly a single GS-13 staff position within the Information Technology Division of AFM. Effective July 2000, the Security Program will be placed in the newly created ARS Office of the Chief

Information Officer. The Program also now includes a full time dedicated GS-14 and GS-13 position. The newly structured program is being based on the following elements:

Policy and Directives
ARS values the sensitivity of its data in terms of integrity, availability, and confidentiality.   As such, ARS will develop and maintain a structure of policies, procedures, and directives to ensure that managers and staff throughout the agency understand their IT security responsibilities and authorities, maintain adequate security measures and tools to protect agency IT resources, and employ sound security practices and rules of behavior.

Long-Term Information System Security Strategy
ARS will implement the long term information system security strategy in a phased approach. The strategy will address goals and objectives, technology needs, resource and budget requirements, emerging technologies (Public Key Infrastructure, telecommuting, E-commerce, etc.), and conformance to Departmental Architecture.

Security Management
The proper security management is important to maintain and support the security strategy after implementation. This will include establishing computer emergency response teams, monitoring of intrusion detection and other security sensors, maintenance and configuration of routers and fire-walls, technical support to decision makers, support to administrators and users, policy enforcement, network configuration control, and a range of other services.

Annual Security Plans
An increased emphasis will be placed on developing and maintaining adequate system security plans. The plans will be developed by system administrators and regularly reviewed by independent contractors to ensure that they adequately address the security issues and requirements of the system and organization.

Awareness and Training Program
A general awareness program will be developed to emphasize the need for security and on-going training for system network administrators, network engineers, security officers, and users. Subsequently, ARS will provide a training program for system administrators, network engineers, security officers, and users.

Risk Assessment and Mitigation
A standard methodology will be developed and implemented to analyze and measure the relative threats and vulnerabilities of a system or facility to waste, loss, or unauthorized use and impact on program mission if an attack occurs.   Risk mitigation strategies will then be developed and implemented to reduce the level of risk to a level acceptable by management.

Contingency Planning
Contingency or disaster recovery plans will be developed to address the appropriate procedures and resources to be employed should events such as power outages, hardware failures, malicious attacks, natural disasters, fires, user or administrator mistakes, or other disasters occur. The plans will address acceptable down time, minimum operating requirements, plan and schedules for full system recovery.

Radio Program
This initiative is a special project to migrate Agency radio communications systems to a new spectrum location and narrower bandwidths. In accordance with Public Law 102-538, the National Telecommunications and Information Administration (NTIA) Organization Act of 1992,

all Agency radio communications systems must undergo spectrum relocation and narrowbanding in order to transfer spectrum from federal to private use. The narrowband transition date is January 1, 2005 for lower spectrum VHF band, and January 1, 2008 for higher spectrum UHF band. No USDA agency is exempt from this change.

ARS is currently utilizing approximately 110 Base Stations, 21 Repeaters, 599 Mobile, 819 Portable, and 144 Miscellaneous radio frequency controlled apparatus on 222 UHF and VHF frequency assignments to support research activities, primarily telemetry data (watershed and animal research), mobile communications, location security, and maintenance. ARS uses ground and air-to-ground communications as necessary for crop and soil experiments and chemical applications on fields. Some maritime frequencies are used by a limited number of ships in Plum Island, New York.

In order to comply with the narrowbanding requirement, much of the ARS radio equipment will need to be replaced over the next four years. The majority of the existing radio equipment is very old, and would normally be replaced over a five-year equipment replacement schedule. ITD in AFM coordinates the purchase of radio equipment and frequency assignments from the NTIA, and will manage the ARS transition to narrowband. ARS will conduct a detailed radio system inventory in 2001 in order to prepare for the migration and schedule equipment replacements.

Portfolio Exhibits

Exhibit 42, Report on Information Technology

Exhibit 42   Report on Information Technology

U. S. Department of Agriculture, Agricultural Research Service
Budget Year 2002
(In Millions)

Line Number Code	Entry	PY BA	CY BA	BY BA
	Part 1. Data on IT Systems By Mission Area			
99-3000	All Part 1. Data on IT Systems By Mission Area			
99-3001	Total development/Modernization/Enhancement (D/M/E)	4.79	6.11	6.56
99-3002	Total Steady State (SS)	17.7	18.23	18.42
99-3003	Total, All Part 1. Data on IT Systems By Mission Area	22.49	24.34	24.98
	Part 2. Data on IT Infrastructure and Office Automation			
01-2000	Other Part 2. Data on IT Infrastructure and Office Automation:			
01-2001	Development/Modernization/Enhancement (D/M/E)	0.27	0.51	1.70
01-2002	Steady State (SS)	7.73	8.50	8.99
01-2003	Subtotal, IT Costs	8	9.01	10.69
	Appropriation/Funding Sources:			
01-2004 01	ARS Salaries and Expenses 1291400	8	9.01	10.69
01-2007	Subtotal, funding sources	8	9.01	10.69
99-3000	All Part 2. Data on IT Infrastructure and Office Automation			
99-3001	Total Development/Modernization/Enhancement (D/M/E)	0.27	0.51	1.70
99-3002	Total Steady State (SS)	7.73	8.50	8.99
99-3003	Total, All Part 2. Data on IT Infrastructure and Office Automation	8	9.01	10.69
	Part 3. Data on IT Architecture and Planning			
	Part 4. IT Resources Summary			
99-3000	Part 1. Data on IT Systems By Mission Area , Part 2. Data on IT Infrastructure and Office Automation , and Part 3. Data on IT Architecture and Planning Totals:			
99-3001	Development/Modernization/Enhancement (D/M/E)	5.06	6.62	8.26
99-3002	Steady State (SS)	25.43	26.73	27.41
99-3003	Total, All IT costs	30.49	33.35	35.67

Form 40, Report on Financial Management Activities and Information Technology

Agricultural Research Service
(in thousands of dollars)

		2000	2001	2002
	Report on Resources for Financial Management Activities			
	Asset Management			
1001	No. of FTE	0.5	0.5	0.5
1002	Budget Authority	40.9	42.4	44.0
	Accounting and Reporting			
2001	No. of FTE	35.6	35.6	35.6
2002	Budget Authority	2,302.0	2,387.2	2,475.5
	Audits of Financial Statements			
3001	No. of FTE	Fr. line 9401	Fr. line 9401	Fr. line 9401
3002	Budget Authority	Fr. line 9402	Fr. line 9402	Fr. line 9402
	Financial Management Systems			
4001	No. of FTE	0.5	0.5	0.5
4002	Budget Authority	45.0	46.7	48.4
	Subtotal			
5001	No. of FTE			
5002	Budget Authority			
	Adjustments			
6001	No. of FTE			
6002	Budget Authority			
	"Total, Net"	36.6	36.6	36.6
7001	No. of FTE	2,387.9	2,476.3	2,567.9
7002	Budget Authority			
	Audits of Financial Statements			
	Contract			
8102	Budget Authority			
	In-house Costs			
8201	No. of FTE			
8202	Budget Authority			
	Org-wide Financial Statements			
	Contract			
9102	Budget Authority			
	In-house Costs			
9201	No. of FTE			
9202	Budget Authority			
	"Total, All Reporting Entities (Audits only)"			
9401	No. of FTE			
9402	Budget Authority			
9998	Budget Contact			
9999	Budget Telephone Number			
	Financial Contact Name	S.M. Helmrich		

Financial Contact Telephone Number 301-504-1257

Form 40, Report on Financial Management Activities and Information Technology (cont.)

Financial Management FTE:

Asset Management:

Series 0501 GS-13 - FTE 0.12
Series 0510 GS-13 - FTE 0.38

Financial Management Systems:

Series 0510 GS-13 - FTE 0.50

Accounting and Reporting:

GS Series	Grade	#FTE
318	5	0.85
318	6	2.15
318	8	0.68
326	4	0.54
334	12	0.66
344	7	0.38
501	9	0.41
501	11	2.83
501	12	2.3
501	13	7
501	14	0.65
503	6	0.05
505	15	0.68
510	9	0.25
510	13	1.5
510	14	1.15
525	7	1.51
560	7	1
560	9	1
560	11	5
560	12	1.51
561	7	0.95
599	4	0.67
2102	8	1.9

Contact Information Sheet

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Technical Profile and Future Direction

Architecture Trends and Direction
In general, ARS will be moving towards more Web-centric systems, providing access to Agency systems via the USDA Internet Access Network. In order to accomplish this, ARS must resolve bandwidth and performance issues and implement a heterogeneous platform environment. The need for remote and mobile computing is also increasing, as customers require access to their data "anywhere and anytime."

The establishment of the ARS CIO organization will provide the opportunity for centralization and coordination of procurement and project activities involving the corporate infrastructure. The CIO organization will establish an agency technology architecture, including guidance and standards for a telecommunications network, data and systems architectures, and corporate applications. In addition, the IPMS system platform will become the defacto technical architecture for Agency program and administration systems.

Interoperability
The decentralized nature of the ARS IT program has presented many challenges for accomplishing interoperability between operating systems, databases, E-mail systems, and Web site data repositories. With the ARS CIO organization in place, ARS can now move towards establishing standards for network and Internet traffic, such as the IP transport protocol. ARS is also moving towards standardizing desktop applications to allow for easier file and data sharing, such as the Microsoft Office suite.

Electronic Commerce (EC)/Electronic Government (EG)
In response to the Government Paperwork Elimination Act (GPEA), ARS has prepared an approach to implement the Act's requirements. This approach includes the establishment of an implementation team to address the following requirements of the Act:

- Identify ARS business processes that would be affected by the use of electronic documents;
- Develop file and retention plans;
- Develop agency policies;
- Provide for technical feedback;
- Include in ARS IT strategic plans; and
- Conduct periodic reviews and evaluation.

ARS views implementation of GPEA in two broad categories: (1) making research results available electronically; and (2) conducting administrative/business processes electronically. Many ARS research results are currently available electronically through ARS web sites. We will continue our efforts to add additional research products. With respect to administrative processes, ARS intends to participate fully in the development and use of corporate administrative systems in USDA. It is our expectation that the enterprise-wide development of key administrative systems–finance, budget, travel, payroll, procurement, and human resources–will provide ARS with the means to meet GPEA requirements for most administrative/business processes.

ARS has identified some ongoing business processes and interactions between it and the general public, universities, and other organizations that would be conducive to electronic transactions. These interactions are administrative processes involving the exchange of information and forms related to personnel, extramural and other types of agreements, contract bids, policies and procedures, etc. The agency Web site currently hosts various Web pages that provide the exchange of information in these areas.

Information Technology Security
See *Information Technology Security* in previous section, *IT Initiative Highlights*.

Collaboration Tools
ARS is beginning to explore the uses of collaboration tools which allow virtual teams and projects to share and exchange data real-time, regardless of geographic location. ARS anticipates more and more customers will have the need for collaboration tools, and will be performing a needs assessment to develop an appropriate technical approach to acquiring and implementing collaboration tools.

Smart Cards
ARS does not currently utilize smart card technology for program operations.

Confidentiality of Electronic Information
The agency's Network Operating System, NetWare, employs several industry standard encryption methods. The agency network also has some inherent protection from vulnerability as a result of its configuration as a sub-network of the USDA backbone network (HqNet). USDA's Network Services Division maintains a Checkpoint firewall between the HqNet and the Department's Internet service provider, UUNet.

ARS also uses Netscape Communicator as its standard WEB browser, which includes 128-bit encryption. That functionality allows us to connect to such sites as the Thrift Savings Plan and Employee Express, and be able to submit personal information such as SSN and PIN numbers without fear of that information being compromised.

Most ARS units utilize Departmental resources for its NFC connectivity. The Departmental resources exist on HqNet where a firewall has been configured according to NFC parameters to communicate with an NFC firewall in New Orleans. The fire walls create an encrypted tunnel over the T1 circuit.

IT Accommodation/Accessibility
ARS is in the process of addressing the regulatory requirements of Section 508 of the Rehabilitation Act. This act prohibits federal agencies from developing, purchasing, or maintaining IT systems which are not accessible to individuals with disabilities. ARS' initial focus will be to review the root ARS Web page, and make any changes necessary to ensure it meets the accessibility standards. The Procurement and Property Division of AFM has also developed a draft bulletin addressing the requirements of Section 508.

Financial Systems Activities
See *Financial Systems* in previous section, *IT Initiative Highlights*.

Data Management/Data Sharing

With the establishment of a corporate IT management structure, the ARS Chief Information Officer organization, ARS is now positioned to pursue enterprise-wide architectural standards and develop the mechanisms to facilitate and manage shared resources such as an Agency data architecture repository. Until now, data management and data sharing have been accomplished on a unit-by-unit basis, with no formal or central data management or data administration function. Many data standards are taken from existing organizations and databases such as those of NFC systems. The IPMS initiative will establish the defacto Agency data architecture for programmatic and Agency administrative applications, including data sharing and naming standards.

Records Management/ E-Records

ARS recognizes the need to consolidate our individual and our Mission-Area approaches with a Department-wide approach to managing electronic records (e-records), including e-mail. IRM efforts, previously distracted by Y2k, are now being focused on system security as well as meeting the requirements of the Government Paperwork Elimination Act (GPEA). With these new initiatives, particularly GPEA, comes the need to develop disposition-based records management options.

ARS' goal is to continue to educate managers and employees about the value and importance of properly managing records in all media. Our intention is to partner records management (RM) training with exposure to technological developments so that users are reminded of RM responsibilities while learning about software upgrades. Specifically, we are advancing this approach through the following efforts:

- Coupling practical RM training opportunities with e-mail software upgrades,
- Providing Web based tools for training as well as access to RM guidance, and
- Updating Agency records schedules for all media.

REE agencies are evaluating e-recordkeeping software, which as a relatively new technology is still in its infancy. We believe it will continue to evolve, become more user friendly, and be available at a lower cost in the upcoming years. We also believe it would be impractical and ineffective over the long term to modify existing systems for the purpose of managing e-records. Our position is supported by the following facts:

- The National Archives and Records Administration (NARA) itself is not using an e-recordkeeping system. They, in fact, have just announced plans to conduct a pilot test of the Provenance e-recordkeeping system software. NARA is particularly interested in its recent software modifications which incorporate auto-filing technology. This technology effectively manages e-records for the user rather than requiring the user to manage their e-records.
- Vendors currently meeting DoD Standard 5015.2, which certifies if e-recordkeeping systems meet NARA requirements, is still ineffective in addressing fundamental vulnerabilities allowing users to circumvent system archiving and transfer requirements.
- An approved Federal meta-data standard is still unavailable for agencies to follow in uniformly managing and archiving all electronic records.

Therefore, ARS intends to continue to evaluate vendor improvements in e-recordkeeping

software, monitor NARA's pilot test results, and monitor joint public and private efforts to develop an accepted meta-data standard. We consider this to be a responsible approach until the technology currently being tested by other agencies proves to be effective in meeting legislative requirements.

Reduction of Stove Pipe Systems

New program management and administration systems initiatives are evaluated for integration requirements with existing or planned information systems prior to approval and funding. Individual systems supporting specific research projects outside the scope of a corporate technical and information architecture do not require integration into the ARS information systems architecture.

Legacy Systems

As mentioned in earlier sections, several ARS legacy systems are currently in the process of redesign for technical modernization within a corporate technical architecture, data integration, and enhanced/updated functionality according to current business requirements. These include the RMIS, ARMPS, BAS and LOTS systems.

Electronic Forms

At the present time, ARS uses InForms software to develop electronic forms, including public use and inter-agency forms. ARS' goal for electronic forms is to provide on-line forms on the Internet with database connectivity and full forms functionality, including electronic signatures, automatic calculations, and database lookup. ARS is working towards this goal, but at present, only provides copies of downloadable forms on the Internet. For ARS employees with InForms software, the these forms can be downloaded and filled-in electronically.

InForms cannot be used for full Internet-based forms support without the purchase of software for each user site. This makes InForms and expensive and impractical solution for accomplishing on-line electronic forms for ARS employees and customers. ITD staff are currently examining other solutions for on-line electronic forms, and will begin conversion of the existing forms to on-line versions once the appropriate technology has been acquired.

Electronic Freedom of Information Act (E-FOIA)

The REE agencies are working toward compliance with the electronic Freedom of Information Act electronic documents requirements referred to as E-FOIA. The ARS Information Staff has the lead for making records available under the requirements of 7 CFR Part 1 and REE Policy and Procedures 158.1, Freedom of Information Act and Privacy Act Guidelines.

The Federal FOIA amendments require agencies to provide records in any form or format requested by the FOIA requester if the records are readily reproducible by the Agency in the form or format requested. This provision includes making records available electronically. Another provision requires that agencies make reasonable efforts to maintain its records in forms or formats that are reproducible for purposes of the FOIA. Again, this includes maintaining records electronically. The last provision requires agencies to make reasonable efforts to search for records in electronic form or format, except when such efforts would significantly interfere with the operation of the Agency's automated information system.